

Outcomes of Operative Management of Isolated Greater Tuberosity Fractures

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INTRODUCTION: Displaced fractures of the greater tuberosity of the humerus are typically operatively managed to avoid impingement and functional limitations. The outcomes of greater tuberosity fractures that occur in isolation versus in the setting of concomitant dislocation are not well understood. This study assessed the outcomes of operative management of greater tuberosity fractures and sought to identify characteristics associated with inferior outcomes.

METHODS: All patients who were operatively managed for a greater tuberosity fracture of the humerus between 2008 and 2023 were reviewed. After excluding patients who had less than 6 months of follow-up, an ipsilateral fracture distal to the proximal humerus, or a pathologic fracture, 34 patients were included (50% female; mean age 55.6 years; mean BMI 31.8 kg/m²; mean follow-up 4.6 years). Fractures were classified according to the Mutch classification, with 68% split fractures, 18% avulsion fractures, and 15% depression fractures. Of these fractures, combined injury patterns were observed, including 12 (35%) split-avulsion, 5 (15%) depression-avulsion, and 2 (6%) split-depression fractures. The greater tuberosity was fractured into at least 2 fragments in 18 (53%) cases. Twenty (59%) of patients sustained a concomitant dislocation, including 18 anterior dislocations and 2 cases of luxatio erecta. Fractures were predominantly fixed with plates (85%), with 9% undergoing screw-only fixation and 6% suture anchor fixation. Postoperative outcomes and complications were recorded. American Shoulder Elbow Surgeons score (ASES), Subjective Shoulder Value (SSV), Numeric Pain Rating Scale (NPRS), Global Pain, and satisfaction were assessed at final follow-up. Fracture reduction quality and other radiographic parameters were assessed on postoperative radiograph.

RESULTS: Patient-reported outcomes and complications were not uniformly satisfactory. Patients with concomitant dislocations had inferior ASES (82.4 ± 17.6 vs. 98.3 ± 2.9 ; $p=0.026$) and Global Pain scores (16.5 ± 15.8 vs. 3.0 ± 3.5 ; $p=0.047$). There was no difference in patient-reported outcomes based on fracture pattern. However, a combined split-avulsion injury was associated with significantly higher NPRS (1.9 ± 1.6 vs. 0.3 ± 0.8 ; $p=0.019$) and lower ASES scores, although differences in ASES scores did not reach statistical significance (81.4 ± 20.4 vs. 94.7 ± 6.0 ; $p=0.4$). PROs did not significantly differ by level of comminution, reduction quality, or fracture displacement. The complication rate was significantly higher in patients who were malreduced (88% vs. 44%; $p=0.046$). Upon multivariate analysis, this association remained significant, with malreduction associated with a 9 times higher odds of complications (OR, 9.1; 95% confidence interval, 1.3 to 187.1; $p=0.023$). There were no significant associations between complications and age, sex, BMI, level of displacement or comminution, or concomitant dislocation. The reoperation rate was 18%, with reoperations performed for rotator cuff repair ($n=4$), hardware removal ($n=3$), reverse shoulder arthroplasty ($n=2$), and revision ORIF ($n=2$). In patients with a concomitant dislocation, time to reduction did not significantly differ between patients who did and did not develop a complication ($p=0.211$). Final forward elevation and external rotation did not differ by concomitant dislocation either ($p \leq 0.513$).

DISCUSSION AND CONCLUSION: The outcome of isolated fractures of the greater tuberosity is dramatically influenced by the quality of fracture reduction: poor fracture reduction increased the likelihood of complications nine-fold. The overall reoperation rate in our study approached 20% and included revision internal fixation, rotator cuff repair, hardware removal, and conversion to reverse shoulder arthroplasty. Patients with greater tuberosity fractures with associated dislocations had significantly lower patient-reported outcomes. Several patients had combined injury patterns, with worse patient-reported outcomes in those with split-avulsion fractures.